

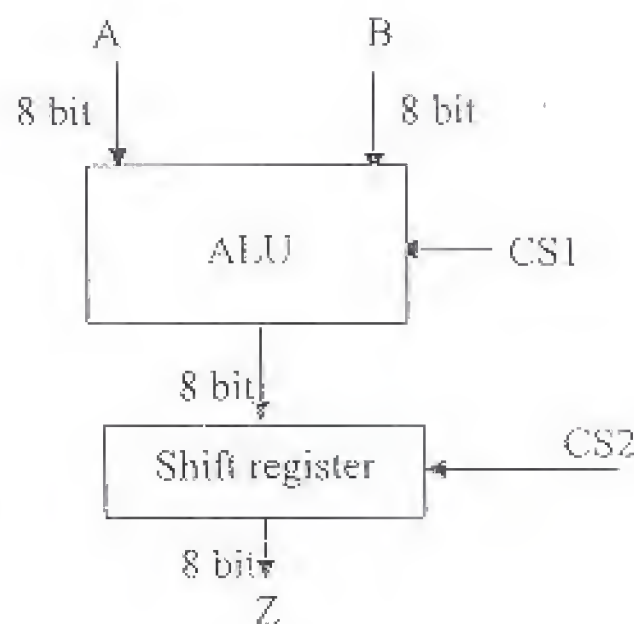
محمد رفيع

الفصل الدراسي الاول 2009/2008 الفرقة : الثالثة (لائحة قديمة)  
المادة : اختبارات وقياسات  
الزمن : 3 ساعة

جامعة طنطا  
كلية الهندسة  
قسم هندسة الحاسبات والتحكم الآلي

Answer all the following questions

- Q.1) Write a VHDL program using the structural model for the following circuit: ALU performs the following functions (add, subtract, and, or, rotate left), CS1 is a control signal of the ALU functions and CS2 is a control signal of the shift register operation for passing the input data or shift left or shift right.



- Q.2) Determine the type of the following VHDL code and its function:

`Signal_name'active , scalar_type'high , sla , & , unaffected ,  
to_bitvector(expression).`

- Q.3) State whether each of the following statements is correct or false and correct the false:

- A constant can be assigned a new value if the new value is equal to the previous one. ✗
- Process is a specification of a sequential operations describing system behavior. ✓
- It is possible to check previous values of VHDL signals. ✓
- Signals are assigned values only when the process suspends. ✗
- Both signals and variables can be used to store temporal data inside processes. ✓
- The if ... then .... statement can only be used inside processes. ✗
- If an impulse on a signal line is wider than the delay, an inertial delay model and a transport delay model will give exactly the same results. ✓
- Each system specified in VHDL is a composition of an entity and an architecture. ✓

تابع الورقة الثانية

arithmetic

- i) Execution of a process stops when the end clause is reached. ✗
- j) Since process is an infinite loop thus a wait statement at the beginning ✓  
of a process plays the same role as one located towards its end.

Q.4) Fill in the table below according to the following VHDL code:

```
process
variable NUM, SUM : integer := 0;
begin
wait for 10 ns;
NUM := NUM + 1;
SUM := SUM + NUM;
end process
```

```
architecture X of Y is
signal NUM, SUM : integer := 0;
begin
process
begin
wait for 10 ns;
NUM <= NUM + 1;
SUM <= SUM + NUM;
end process;
end X;
```

Time	Variables		Signals	
	NUM	SUM	NUM	SUM
0 ns	--	--	--	--
10 ns	--	--	--	--
10+ $\delta$	--	--	--	--
20	--	--	--	--
20+ $\delta$	--	--	--	--
30	--	--	--	--
30+ $\delta$	--	--	--	--

تابع الورقة الثالثة

Q.5) Write the appropriate VHDL statement for the following operations:

- Define an integer variable with a name **Var** and initial value equals to 16.
- Define a bus with a name **Sig** of 16 bits.
- Define a new data type with a name **small\_int** and the values 1,2,3,4.
- Shift left the value of the signal **Num** into two positions. *Moo*
- Test if the clock signal **Clk** is in a rising edge state.
- Get the last value of a signal **Sum**.

Q.6) Write the VHDL code of a circuit to generate a waveform with the following characteristics and with an enable signal:



مع أطيب التمنيات بالنجاح  
أ.م. السيد م.م.



### Answer The Following

1-Suppose four machines, A,B,C and D produce 0.20, 0.28 ,0.27 ,and 0.25 respectively of the total products in a company . The machines have probability 0.01, 0.02, 0.03, and 0.04 of producing a defective unit. One of these units is selected at random . Find the probability that: i-The unit is defective, ii-The unit was produced by B and defective, iii- The unit was produced by C or D and defective.

2- Given that the discrete random variable  $X$  has the mass function

$\Pr(X = x) = x/6$  where  $x = 1, 2, 3$  and 0 otherwise. Describe and graph its cumulative distribution function  $F(x)$ .

3-Using the normal distribution table , find  $\Pr(-0.47 < z < 0.94)$  ,  $\Phi(-0.45)$  ,  $\Pr(-0.47 < z < 0.94)$ . using  $\Phi(-0.47)$  ,  $\Phi(0.94)$  .

4-Find the regression line for the following data

x	2	3	5	4	6	5
y	1	3	2	5	7	4

5- The following are the data for control group C and experimental group E. Do the two means differ significantly?, at level  $\alpha = 0.05$ .

C	5	3	2	3	1	4
E	7	4	1	4	2	6

$$t(10, 0.025) = 2.228$$

6-If a random variable  $x$  is normally distributed with mean 118 and a standard deviation 11, find

- the z-scores of 115,134 and 99,

$$-P(115 < x < 123), P(-115 < x < 115), P(x < 115), P(115 < x)$$

$$t(10, 0.025) = 2.228$$



Answer the following questions:

Q(1): Put (✓) for true statement or (x) for false statement (13 degree)

- [1] The 80386 was 16-bit microprocessor.
- [2] The memory system is divided into TPA, XMS.
- [3] A bus is set of common connection lines that carry the same type of information.
- [4] In real mode, segments can begin at any location in the memory system.
- [5] The global descriptor table is a maximum 8192 bytes in length.
- [6] MOV BL, AX
- [7] MOV CS, BX
- [8] PUSH AX is equivalent to PUSH EAX
- [9] A memory segment can touch or even overlap.
- [10] MOV ES, DS
- [11] MOV [DI], [BX]

Q(2): [a] Draw the internal architecture of the microprocessor 80386 then describe the use of all registers. (15 degree)

[b] Comparison in detail between: (15 degree)

- 1) The real mode operation and the protected mode operation.
- 2) The 16-bit instruction and the 32-bit instruction.
- 3) The local descriptor and the global descriptor.

Q(3): [a] In the microprocessor 80286, explain the main data addressing modes and give an example for every one. (14 degree)

[b] In a machine language instruction, what is specified by the MOD field? And the R/M field? (8 degree)

Q(4): [a] Suppose that DS = 0400H, BX = 0200H, SS = 0800H, SP = 0001H, and DI = 0300H. Determine the memory address accessed by each of the following instructions, assuming real mode operation: (12 degree)

- 1) MOV AX, [3210]
- 2) PUSH BX
- 3) MOV AX, [BX]

[b] Describe the purpose of the D and W bits found in some machine language instructions. (8 degree)



Answer the following questions:

First question:

- (a) Write the general syntax of declaring *Structures* and *Arrays*?
- (b) Write an algorithm to multiply two square matrices *X* and *Y* of *n* numbers.
- (c) Write a C++ program to create a database of students. Each student is defined by identification number (*ID*), name (*name*), and telephone (*tel*). By using *pointer* to the database, allow a user to input data of 20 students from the keyboard and then prints the database on the screen.

Second question:

- (a) What is a linked list? Show how you declare a node of a linked list containing a data part and a pointer to next node?
- (b) Write an algorithm to perform each of the following operations on a list:
  - (i) Append a node after the first node of a linked list.
  - (ii) Delete the end node from a linked list.
  - (iii) Display the contents of the 3<sup>rd</sup> node in the list.

Third question:

- (a) Show how you can represent *Stack* in C++ programs.
- (b) Write an algorithm to implement *pop* operation.
- (c) Write an algorithm to implement *stacktop* operation.

Fourth question:

- (a) Show how you can represent *Queue* in C++ programs.
- (b) Write a function to implement *empty* operation.
- (c) Write an algorithm to implement *insert* operation.

Fifth question:

- (a) Write a function to recursively compute the factorial of a given number *n*.
- (b) What is the main idea of *Bubble sort*?
- (c) Write a *Bubble sort* algorithm to sort a list of numbers.
- (d) Show the actions done, step-by-step, when sorting the following list by *Quicksort*:

27    10    12    20    25    13    15    22

«With my best wishes»

Answer the following Questions:

1. (a) Sketch the simplified block diagram of an analog communications system and explain its operation.  
  
(b) A communication system with a preamplifier of noise figure 2 dB and gain 10 dB is connected with a cable of noise figure  $F = 4$  and gain 0.5 dB to a receiver of gain 60 dB and noise figure  $F = 12$  dB. Determine the overall noise figure of the system.

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2. (a) Sketch the block diagram of integrated circuit waveform generator and explain its operation  
  
(b) Sketch the block diagram of a PLL and describe how loop acquisition is accomplished with a PLL from an initial unlocked condition until frequency lock is achieved  
(c) Determine the hold-in range for a PLL with an open loop gain of  $K_L = 20$  kHz / rad

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3. (a) Sketch the block diagram of a multiple crystal frequency synthesis and explain its operation.  
  
(b) Describe the relationship between the carrier and sideband powers in an AM DSBFC wave. .  
  
(c) For an AM DSBFC modulator with carrier frequency  $f_c = 100$  kHz and a maximum modulating signal  $f_{m(max)} = 5$  kHz , determine
  - (i) Frequency limits for the upper and lower sidebands.
  - (ii) Bandwidth
  - (iii) Upper and lower side frequencies produced when the modulating signal is a single frequency 3 kHz.

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4. (a) Sketch the block diagram of a high level AM DSBFC transmitter and explain its operation.  
  
(b) For a receiver with IF ,RF, and local oscillator frequencies of 455 kHz, 1100 kHz, and 1555 kHz, respectively ,determine
  - (i) Image frequency
  - (ii) Image frequency rejection ratio for a preselector  $Q = 100$  
(c) Determine the net receiver gain for an AM receiver with the following gains and losses: RF amplifier = 30 dB , IF amplifier = 44 dB, Audio amplifier = 24 dB , preselector loss = 2 dB, mixer loss = 6 dB , detector loss = 8dB

Good Luck



الزمن : ساعتان  
2009 /1/29

امتحان الفرقة الثالثة  
تنظيم صناعي (لائحة قديمة)

جامعة طنطا  
كلية الهندسة  
قسم الحسابات والتحكم الآلي

اجب عن الأسئلة الآتية:-

- 1- ما هي العوامل (العناصر) الرئيسية التي تؤثر على تكلفة الانتاج وتكلفة الاستثمار؟ وما هي نقطة التعادل بالنسبة للمشروع الصناعي وأهمية تحديدها؟
- 2- تعتمد الحسابات المالية للمنشآت الصناعية على نظام لتسجيل الإيرادات والمصروفات وصولا الى الميزانية العمومية للمنشأة ، وما هي الخطوات الواجب اتباعها في عمليات التسجيل وصولا الى بيان الميزانية العمومية ومكوناتها الرئيسية؟
- 3- تهتم السلامة الصناعية (الامن الصناعي) بحماية عناصر الانتاج ، بين مكونات عناصر الانتاج في المشروعات الصناعية وكيف يمكن حمايتها من المخاطر ومن الحوادث؟
- 4- هناك عناصر اساسية ، وعناصر ضرورية ، وعناصر لازمة (هامية) تدخل جميعها في عمليات التصنيع، ما هي مكونات تلك العناصر الثلاث.
- 5- يوضح الجدول التالي حركة المخزون للمواد التي تدخل في عمليات التشغيل في مشروع صناعي:-

التاريخ	سعر الشراء / طن	المواد الداخلة بالطن	الرصيد بالطن
2008/2/5	120	10000	10000
2008/4/12	130	12000	22000
2008/7/16	145	8000	30000
2008/10/12	150	5000	35000

احسب تكلفة التكلفة التقديرية لعدد 42000 طن من المواد باستخدام الطرق الثلاث لتقدير تكلفة المواد المستخدمة في عمليات التشغيل.



جامعة طنطا  
الكلية الهندسية

# TANTA UNIVERSITY FACULTY OF ENGINEERING

Department : Computer and Control Engineering

Lecturer : Professor Ahmed F. Amer

Subject : Automatic Control Engineering

Date : 15 / 1 / 2009

Marks : 85

Time : 3 Hrs

## Final Exam

### Answer the Following Questions:

- 1.a) For the schematic diagram of the antenna position control system shown in Fig.1 below: i- obtain the open-loop T.F. relating the angular velocity of the load to a step-voltage input to the power amplifier. Find in this case, the damping ratio and natural frequency in terms of the system parameters.  
ii- derive the closed loop system transfer function relating the input angular position to the output angular position.

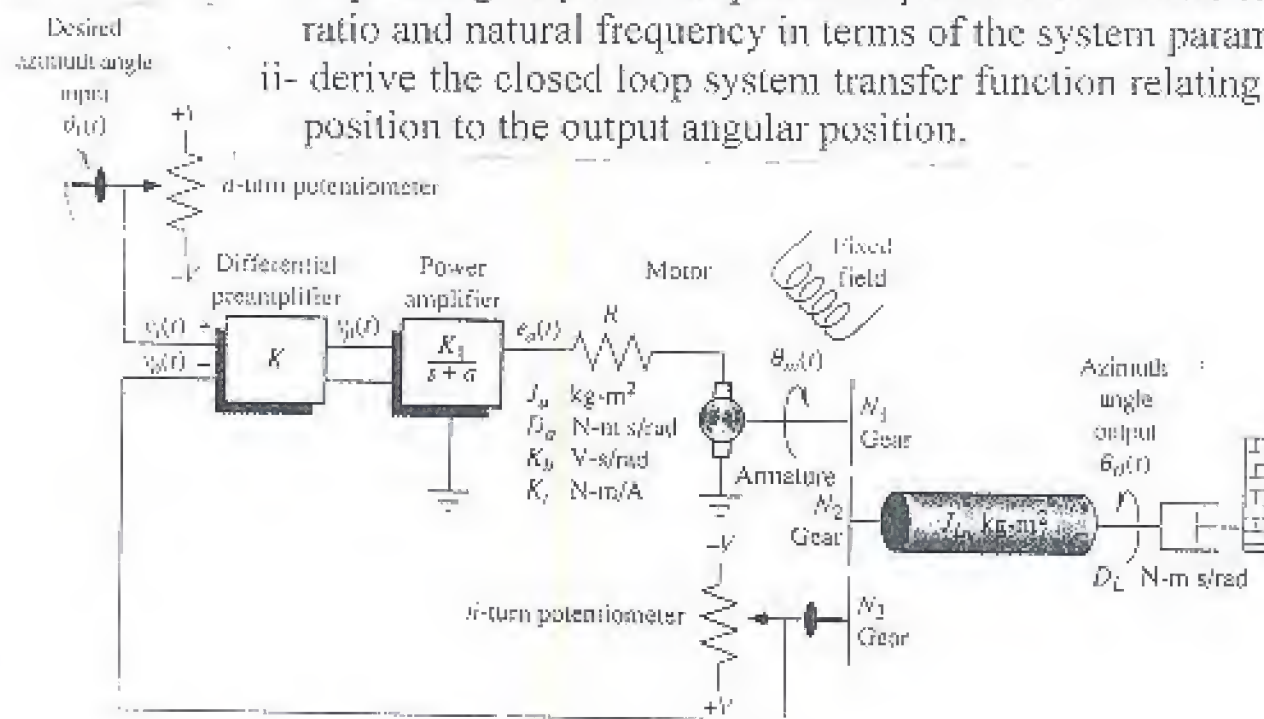


Fig.1

- 2.a) Find the transfer function,  $G(s) = V_1(s)/V(s)$ , for the network shown in Fig.2 below.

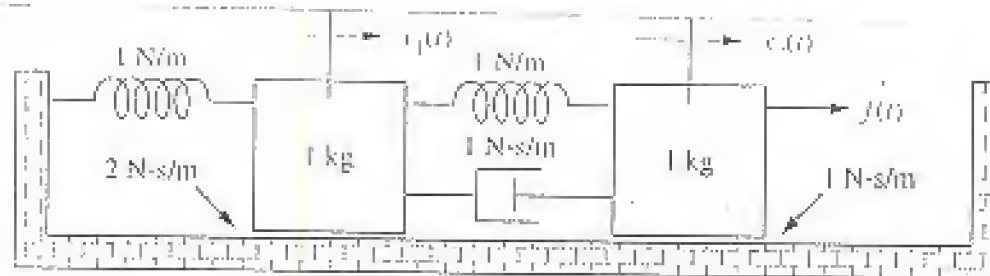


Fig.2

- b) For the system of Fig.3 find the transfer function,  $G(s) = X_1(s)/F(s)$ .

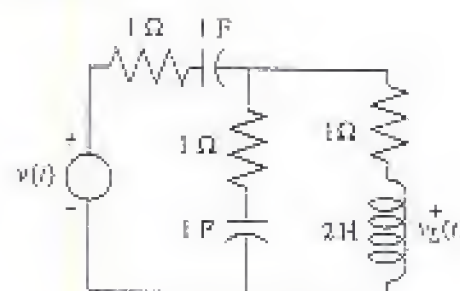


Fig.3



3.a) Given the unity feedback control system whose transfer function  $G(s)$  where,

$$G(s) = \frac{k(s-1)(s-2)}{(s+2)(s^2+2s+2)}$$

find the following

- i- the range of  $k$  that keeps the system stable.
- ii- The value of  $k$  that makes the system oscillate.
- iii- The frequency of oscillation when  $k$  is set to the value that makes the system oscillate.

b) The open-loop transfer function of a unity feedback system  $G(s)$  is given by,

$$G(s) = \frac{k(s+12)}{(s+5)(s+10)}$$

find value of  $k$  to yield a steady-state error of 0.1 for a ramp input  $50tu(t)$

4. a) For the open-loop transfer function of a unity feedback system  $G(s)$  is given by,

$$G(s) = \frac{k(s+3)}{s(s+1)(s+2)(s+4)}$$

Sketch the root locus.

5. a) Using the Nyquist criterion for the unity feedback system given by its transfer function  $G(s)$  where,

$$G(s) = \frac{k}{s(s+3)(s+5)}$$

find the range of gain,  $k$ , for stability, instability, and the value of gain for marginal stability. For marginal stability, also find the frequency of oscillation.

b) Draw the Bode log-magnitude and phase plots of  $G(s)$  for the unity feedback system, where,

$$G(s) = \frac{(s+3)}{(s+2)(s^2+2s+25)}$$

Find also the system gain margin and the system phase margin.